LARES energy systems

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Laboratory for Renewable Energy Systems (LARES)

Laboratory for Renewable Energy Systems (LARES) of University of Zagreb, Faculty of Electrical Engineering and Computing is focused on research and development of control systems with application in:

- renewable energy systems, with emphasis on wind energy and solar energy sources
- integration of renewable energy systems in power grids, on the level of microgrids and smart grids,
- smart cities, including optimization of energy and water consumption in buildings through interaction with a local microgrid and smartgrid, together with the water distribution network.

Laboratory equipment

Research and development is conducted through international and domestic research projects financed by public or industry funds. LARES staff includes 5 professors and around 15 full time researchers. Laboratory research equipment:

- scaled model of MW size wind turbine placed in air chamber with controllable blower rated 11 kW for generation of variable wind with speeds up to 11 m/s,
- 4 fixed photovoltaic arrays rated 3.5 kWp with the ability of manual tilt adjustment along elevation axis,
- 2 photovoltaic arrays 3.5 kWp mounted on azimuth–altitude dual axis tracker with full controllability
- DC microgrid comprised of (i) photovoltaic array rated 1.6 kWp mounted on dual axis tracker, (ii) battery storage system 48 V/200 Ah, (iii) electrolyser for hydrogen production rated 1 kW, metal hydride hydrogen storage and a fuel-cell rated 500 W, (iv) connection to the Faculty distribution grid, (v) controllable converters between microgrid elements and microgrid DC bus,
- meteorological instruments for measurement of solar radiation components (direct, diffuse, reflected, in tilted surface of individual photovoltaic fields).

Research projects

- ACROSS – Centre of Research Excellence for Advanced Cooperative Systems, EU FP7 [www.across.fer.hr]
- MICROGRID – Optimization of renewable electricity generation systems connected in a microgrid [www.microgrid.fer.hr], HRZZ
- PoC-WTGFTC – Proof of Concept for Wind Turbine Generator Fault-tolerant Control, BICRO PoC
- CEEStructHealth – Centre of Excellence for Structural Health, EFRR
- UrbanWater – Intelligent Urban Water Management System, EU FP7
- Will4Wind – Weather Intelligence for Wind Energy, EFRR
- MONGS – Monitoring of Wind Turbine Generator Systems, EU FP7 SEE-ERA.net PLUS
- ThermalMapper – Thermal 3D Modeling of Indoor Environments for Saving Energy, EU FP7 SEE-ERA.net PLUS
- AEOLUS – Distributed Control of Large-Scale Offshore Wind Farms, EU FP7
- MultiWind -- Multi-criteria Wind Turbine Control, HRZZ

Wind turbine control and monitoring system, Končar - Electrical Engineering Institute Inc.